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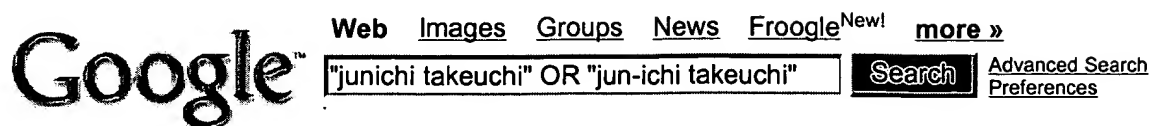
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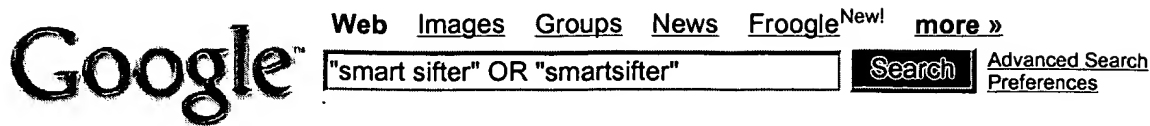
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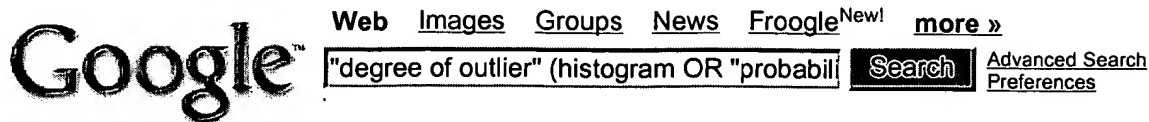
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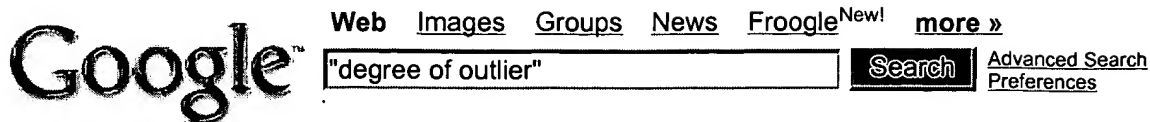
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4. J. Takeuchi, T. Kawabata, and A. R. Barron:
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April 21st, 2004

Go to [the top of Jun'ichi Takeuchi's page](#)

Go to [the top of NEC R&D on Data & Text Mining](#)

Jun-ichi Takeuchi

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2	Shun-ichi Amari	[6]
3	Peter Milne	[7]
4	Satoshi Morinaga	[10]
5	Atsuyoshi Nakamura	[4] [5]
6	Manfred K. Warmuth	[1]
7	Graham J. Williams	[7]
8	Kenji Yamanishi	[7] [8] [9] [10]

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Kenji Yamanishi

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1	Toshikazu Fukushima	[28]
2	Akihiko Konagaya	[2]
3	Hang Li	[17] [20] [23] [25] [26] [29]
4	Hiroshi Mamitsuka	[6] [11]
5	Peter Milne	[22]
6	Satoshi Morinaga	[28] [30]
7	Jun-ichi Takeuchi	[22] [24] [27] [30]
8	Kenji Tateishi	[28]
9	Graham J. Williams	[22]

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Graham Williams: Publications



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- Data Mining and Machine Learning
 - Spatial Reasoning
 - Databases and Legacy Systems
 - Knowledge Representation
-

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Simon Hawkins, Graham Williams, Rohan Baxter, Peter Christen, Michael Fett, Markus Hegland,
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Proceedings of the Sixth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining
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Mining Taxation Data with Parallel BMARS[[pdf](#) [ps](#)]

Sergey Bakin, Markus Hegland, and Graham Williams
Parallel Algorithms and Applications
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The Integrated Delivery of Large-Scale Data Mining: The ACSys Data Mining Project

Graham Williams, Irfan Altas, Sergey Bakin, Peter Christen, Markus Hegland,
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In Large-Scale Parallel Data Mining, State-of-the-Art Survey
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Lecture Notes in Artificial Intelligence, Volume 1759
Springer-Verlag, 2000

Data Mining Tools

Irfan Altas, Sergey Bakin, Markus Hegland, Stephen Roberts, Berwin Turlach, and Graham Williams
IEEE Transactions on Concurrency
Submitted 1999

An Overview of ACSys Data Mining

Graham J. Williams
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(CTAC99)
Canberra, September 1999

Integrated Delivery of Data Mining

Graham J. Williams
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San Diego, August 1999

Evolving Interestingness for Data Mining

Graham J. Williams
Third Pacific-Asia Conference on Knowledge Discovery and Data Mining
Beijing, April 1999

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Graham J. Williams
SEAL'98
Canberra, November 1998

Evolvolutionary Techniques in Data Mining Interestingness

Graham J. Williams
Workshop on Evolutionary Computation
Canberra, October 1998

The Data Miner's Arcade: Pluggable Data Mining

Graham J. Williams
Technical Report
May 1998.

Abstract

The Data Miner's Arcade is a Java-based environment for data mining. It implements an Object-Oriented model for the Data Mining process, with **standard** interfaces for accessing data and for delivering results. By developing standards, new tools can plug into the environment with a minimum of effort, providing 'Plug-n-Play' opportunities with new tools as they become available. Data can be accessed from Database systems through ODBC and JDBC, or from other sources and managed internally within the Arcade. The Extensible Markup Language (XML) is used as the target "language" for all Data Mining tools within the environment. The Predictive Modelling Markup Language (PMML) developed by UIC is an example of the XML markup that the system handles. Data Mining tools produce as their output documents that conform to PMML. These can then be visualised, run, or combined with other models as appropriate, all within The Data Miner's Arcade environment.

To What Extent can Data Mining be Proceduralised

Graham J. Williams
Panel Discussion
Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-98)
Melbourne, April 1998.

High Performance Data Managment Issues in Data Mining

Graham J. Williams
Presented to the Workshop on Parallel and Distributed Data Mining
Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-98)
Melbourne, April 1998.

Mining the Knowledge Mine: The Hot Spots Methodology for Mining Large Real World Databases

[[pdf](#) [ps](#) [ps.gz](#)]

Graham J. Williams and Zhexue Huang
in *Advanced Topics in Artificial Intelligence*
Lecture Notes in Artificial Intelligence
Volume 1342, Pages 340--348
Springer-Verlag, 1997

Abstract

As databases grow in size and complexity the task of adding value to the wealth of data becomes difficult. Data mining has emerged as the technology to add value to enormous databases by finding new and important snippets (or nuggets) of knowledge. With large training sets, however, extremely large collections of nuggets are being extracted, leading to much "fools gold" amongst which to fossick for the real gold. Attention is now being directed towards the problem of how to better focus on the most precious nuggets. This paper presents the hot spots methodology, adopting a multi-strategy and interactive approach to help focus on the important nuggets. The methodology first performs data mining and then explores the resulting models to find the important nuggets contained therein. This approach is demonstrated in insurance and fraud applications.

PEPNet: Parallel Evolutionary Programming for Constructing Artificial Neural Networks

[[pdf](#) [ps](#) [ps.gz](#)].

Gerrit A. Riessen, Graham J. Williams, and Xin Yao
Sixth Annual Conference On Evolutionary Programming (EP97)
Indianapolis

Abstract

This paper presents a description of an evolutionary artificial neural network algorithm, EPNet and its extension taking advantage of a High Performance Computing Environment. PEPNet, Parallel EPNet, implements four forms of parallelism and this paper describes two of those parallelisms. Experimental studies have shown promising results with better time and prediction performance.

A Case Study in Knowledge Acquisition for Insurance Risk Assessment using a KDD Methodology

[[pdf](#) [ps](#) [ps.gz](#)]

Graham J. Williams and Zhexue Huang
Pacific Rim Knowledge Acquisition Workshop (PKAW96)
Sydney

Abstract

We describe some initial experiences in dealing with the task of acquiring knowledge where a very large collection of case histories is available. A Knowledge Discovery in Databases (KDD) approach is taken. KDD is the process of extracting novel information and knowledge from large databases, consisting of many interacting stages performing specific data manipulation and transformation operations with an information flow from one stage onto the next (and usually with feedback into previous stages). We characterise our experiences of this process for the task of acquiring knowledge for the domain of motor vehicle insurance premium setting for NRMA Insurance Limited.

Parallel Decision Tree Induction

Graham J. Williams
CSIRO DIT Data Mining Technical Report TR-DM-96024

Abstract

Knowledge discovery in databases (or KDD) and its associated data mining technologies are making enormous demands on traditional machine learning and statistical algorithms. KDD often deals with extremely large databases, often in sizes measured in terms of gigabytes rather than megabytes. Traditional machine learning and statistical techniques begin to be stretched beyond their capabilities when the data sizes reach many thousands of records. In this paper I review our work in dealing with very large datasets in the context of traditional decision tree induction algorithms (ID3 and C4.5). MIL (Williams 1988, Williams 1990), for Multiple Inductive Learning, is a system for inducing multiple decision trees in parallel, transforming those trees to rules, and then intelligently merging the resulting rule sets into a unified knowledge base. Our efforts to parallelise the decision tree induction algorithm for the Fujitsu AP1000 and the Thinking Machine Corporation's CM-5 high performance computers are also reviewed.

PEPNet: Parallel Evolutionary Artificial Neural Networks (Poster)

[[pdf](#) [ps](#) [ps.gz](#)]

Gerrit Riessen, Xin Yao, Zhexue Huang, Peter Milne, and Graham Williams
Fifth Australian Conference on Neural Networks (ACNN96)

Abstract

Artificial Neural Networks (ANNs) provide an important classification tool for Knowledge Discovery in Databases (KDD). Unfortunately ANNs require considerable time to train, particularly when large datasets are involved. Training time is also adversely affected when the characteristics of the dataset are not consistent with the structure of the ANN. In developing ANNs there are no hard and fast rules for determining the structure of the network. Evolutionary Artificial Neural Networks (EANNs) take advantage of evolutionary search techniques to address some of the problems associated with developing optimal ANNs. EANNs dynamically modify the structure of the ANNs on the basis of performance. EPNet (Yao and Liu 1996) is a serial algorithm which adopts these ideas to produce efficient ANNs. Such techniques produce greater accuracy in the networks, however at the expense of extra computational and storage requirements. Our work focuses on PEANNs, Parallel Evolutionary Artificial Neural Networks. PEANNs have the potential to produce accurate networks in significantly less time than serial EANNs using larger datasets. A parallel implementation of EPNet, called PEPNet, is being developed to explore this hypothesis.

KDD for Insurance Risk Assessment

Graham J. Williams and Zhexue Huang
March 1996
CSIRO DIT Data Mining Technical Report TR-DM-96014

Abstract

Insurance is a business of risks. Identifying and understanding areas of risk is an important task performed by an insurer. An assessment of risk is used to set the appropriate premium for insurance policies. This paper describes a KDD exercise which uses decision tree techniques to identify significant areas of risk within an insurance portfolio. The real world dataset used contains information about policies and insurance claims on those policies. Decision trees can be

constructed to identify and describe areas of high risk which are then evaluated, as a separate exercise, in terms of claim frequency and claim costs. The paper stresses the idea of interactive post-processing, or evaluation, of the patterns that are illuminated by traditional data mining tools.

Modelling the KDD Process

Graham J. Williams and Zhexue Huang

February 1996

CSIRO DIT Data Mining Technical Report TR-DM-96013

Abstract

Knowledge Discovery in Databases (KDD) is the process of extracting novel information and knowledge from large databases. This process consists of many interacting stages performing specific data manipulation and transformation operations with an information flow from one stage onto the next (and often back into previous stages). The process can be very complex and may exhibit much variety in the context of the variety tasks undertaken within KDD. In this paper we characterise our experiences of the KDD process and formalise its key elements in a model. A case study of insurance risk analysis for policy premium setting is used to illustrate the process and the model. The model provides a framework for comparing and differentiating various approaches to KDD.

Inducing and Combining Multiple Decision Trees

[280K gzip Postscript]

Graham J. Williams

PhD Thesis, Australian National University,
Canberra, Australia, 1990

Abstract

Most activities in our daily life require us to make decisions, many subconsciously. Knowledge is the key to correct decision making. Its representation and use by machine has been a major goal throughout the history of computing machinery. Learning is one of the most important components of intelligence and is a crucial aspect of knowledge-based systems. The research reported on here focuses on the acquisition of decision trees and their transformation to rules. A well-established practical tool for machine learning (ID3) is used as a basis for an approach to building, and then combining, multiple decision trees.

Combining Decision Trees: Initial results from the MIL algorithm

Graham J Williams

Artificial Intelligence Developments and Applications

edited by J. S. Gero and R. B. Stanton

Elsevier Science Publishers

1988, Pages 273-289

Some Experiments in Decision Tree Induction

Graham J Williams

Australian Computer Journal
1987, Volume 19, Number 2, Pages 84-91

Spatial Reasoning

Design of Decision Support Systems as Federated Information Systems

D. J. Abel, Kerry Taylor, Gavin Walker, and Graham Williams
Decision Support Systems for Sustainable Development
Edited by Kersten, Mikolajuk, and Yeh
Kluwer Academic Publishers, 1999

Templates for Spatial Reasoning in Responsive GIS

[8K gzip Postscript, first two pages only]

Graham J Williams
International Journal of Geographical Information Systems
1995, Volume 9, Number 2, Pages 117-131

Abstract

Responsive geographical information systems (GIS) address the needs of the decision maker working in a spatially oriented environment where data is regularly updated, where the data is often voluminous, incomplete, and noisy, and where timely decisions must be made. Such environments stretch the capabilities of traditional GIS. A responsive GIS must play a more active role in the support of the decision maker. This paper introduces the concept of a responsive GIS and demonstrates the integration of *artificial intelligence* techniques and *object-oriented database* technology to provide such active support. Expert knowledge, represented as Templates, can have both spatial and temporal components, and remains within the GIS framework rather than providing separate, and often disjoint, GIS and Expert System modules.

Representing Expectations in Spatial Information Systems

Graham J Williams and Steve G. Woods
Advances in Spatial Databases: Third International Symposium, SSD '93
Edited by D. J. Abel and B. C. Ooi
Lecture Notes in Computer Science, Volume 692, Springer-Verlag, 1993

GEM: A Micro-Computer Based Expert System for Geographic Domains

Graham J. Williams, J. Richard Davis and Paul M. Nanninga
Proceedings of the Sixth International Workshop and Conference on Expert Systems and Their Applications
Avignon, France, 1986.

The Design of Expert Systems for Environmental Management

J. Richard Davis, Paul M. Nanninga and G. J. Williams
Readings in Australian Geography
Proceedings of the 21st IAG Conference
Perth, Australia, 1988

Geographic Expert Systems for Resource Management

J. Richard Davis, Paul M. Nanninga and G. J. Williams
Proceedings of the First Australian Conference on Applications of Expert Systems
Sydney, Australia, 1985

Databases and Decision Support Systems

The Design of Decision Support Systems as Federated Information Systems

D. J. Abel, K. L. Taylor, G. C. Walker, and G. J. Williams
Proceedings of the Decision Support Systems for Developing Nations, Taiwan. December 1995

The Virtual Database: A Tool for Migration from Legacy LIS

D. J. Abel, B. C. Ooi, R. A. Power, K.-L. Tan, G. J. Williams, and X. Zhou
In Proceedings of the 22nd Annual Conference of the Australian Urban and Regional Information Systems Association AURISA '94
Sydney, Australia, 1994

The Virtual Database

David J. Abel, Beng Chin Ooi, Robert A. Power, Kian-Lee Tan, Graham J. Williams, and Xiafang Zhou
In Proceedings of the 21st Annual Conference of the Australian Urban and Regional Information Systems Association AURISA '93
Sydney, Australia, 1993

Knowledge Representation

FrameUp: A frames formalism for expert systems

Graham J Williams
Australian Computer Journal
1989, Volume 21, Number 1, Pages 33-40

Abstract

This paper presents an introduction to frames-based representation schemes for use in the construction of rule-based expert systems. The features that are relevant to such expert systems are discussed, followed by an example of the type of rule application mechanism that the system implements. Advantages of such a system are discussed.

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